

THAT CLAIMED IS:

1. A portable circuit interrupting apparatus for use in association with a circuit isolating device comprising:

a main housing having a main housing body including a main housing body outer surface and a longitudinal axis;

a sleeve including a sleeve main body having a sleeve main body outer surface and coaxially mounted within the main housing so as to be slidable between an extended position and a retracted position, a spring assembly for biasing the sleeve main body from between the extended position toward the retracted position, and a reset plunger opening positioned in a medial portion of the main sleeve body;

a shunting circuit assembly having a ring engaging terminal adapted to electrically connect to a ring-like conducting part of a circuit isolating device and a hook engaging terminal adapted to electrically connect to a hook-like conducting part of a circuit isolating device, a shunting circuit segment connected between the ring engaging terminal and the hook engaging terminal and positioned within the housing and sleeve to interrupt an electrical connection between the ring-like conducting part and hook-like conducting part responsive to movement of the sleeve from the retracted position to the extended position;

a reset plunger assembly including a reset plunger and connected to a medial portion of the main housing body, adapted to extend at least portions of the reset plunger through the reset plunger opening in the medial portion of the main sleeve body when in a non-reset and biased inward lock position to releasably lock the sleeve in the extended position so as to obtain and maintain an electrical clearance between the ring engaging terminal and the hook engaging terminal when the ring engaging terminal and the hook engaging terminal engage a circuit isolating device and when the main sleeve body is positioned in the extended position, and adapted to reset outwardly responsive to outwardly biased pressure by a user and outward

pressure from the main sleeve outer surface when the sleeve main body is in an at least partially retracted position; and

an operation counter assembly including an operation counter connected to the reset plunger and positioned to count a number of circuit interrupting operations of the circuit interrupting apparatus and responsive to movement of the reset plunger.

2. A portable circuit interrupting apparatus as defined in Claim 1, wherein the operation counter includes a rotational counter incrementor to increment a count of the operation counter, and wherein the operation counter assembly further includes a roll pin connected to the reset plunger and a click-over lever connected between the rotational counter incrementor and the roll pin and responsive to longitudinal movement of the reset plunger in a first direction to reset the counter to enable the operation counter to increment and responsive to longitudinal movement in a second direction to increment the operation counter when such movement occurs.
3. A portable circuit interrupting apparatus as defined in Claim 1, wherein the operation counter includes a counter incrementor switch to increment a count of the operation counter, and wherein the portable circuit interrupting apparatus further includes means for engaging the counter incrementor switch positioned to increment the operation counter responsive to movement of the reset plunger in a longitudinal direction.
4. A portable circuit interrupting apparatus as defined in Claim 3, wherein the means for engaging the counter incrementor switch includes a magnet positioned adjacent a portion of the reset plunger, and wherein the counter incrementor switch includes a magnetic switch responsive to positioning of the magnet adjacent the magnetic switch resulting from longitudinal movement of the reset plunger.

5. A portable circuit interrupting apparatus as defined in claim 3, wherein the operation counter assembly includes a magnetic flux determiner for measuring the strength of the magnetic flux to determine a categorical type of usage of the circuit interrupting apparatus, and wherein the operation counter separately records a number of counts associated with each of the categorical type of usages.

6. A portable circuit interrupting apparatus as defined in Claim 3, wherein the operation counter assembly further includes a selection switch for selecting a plurality of categories of amperage range of values most closely associated with the circuit isolating device, and wherein the operation counter separately records the count and associates the count with a category selected from the plurality of categories and tracks a number of counts associated with each of the plurality of categories and displays the number of counts associated with the category so selected.

7. A portable circuit interrupting apparatus as defined in Claim 1, wherein the main housing body includes a main housing body opening, and wherein the reset plunger assembly further includes a reset plunger extension connected within and extending out from the main housing body opening and having a reset plunger conduit, and a spring to bias the reset plunger in an inwardly direction such that the reset plunger engages the reset plunger opening when the main sleeve body is extended such that the reset plunger opening is adjacent the reset plunger.

8. A portable circuit interrupting apparatus as defined in Claim 7, wherein the operation counter assembly further includes an operation counter housing having an operation counter housing front, an operation counter housing back, and at least one operation counter housing side positioned therebetween and containing the operation counter within, the operation counter housing back having an operation counter housing back opening positioned in a surrounding relationship around outer surface peripheries of the reset plunger extension to prevent contamination of the operation counter from contaminants external to the operation counter

housing, the operation counter housing front having an operation counter housing front opening also positioned in a surrounding relationship around outer surface peripheries of the reset plunger extension to prevent contamination of the operation counter from contaminants external to the operation counter housing.

9. A portable circuit interrupting apparatus as defined in Claim 1, wherein the operation counter is non-resettable by a field operator in order to prevent inadvertent reset of the operation count.

10. A portable circuit interrupting apparatus as defined in Claim 1, wherein the operation counter assembly includes a fastener to retrofit the operation counter housing to a pre-existing circuit interrupting apparatus.

11. An operation counter assembly adapted to be positioned on a circuit interrupting apparatus for use in association with a circuit isolating device having a main housing including a main housing body outer surface and a sleeve including a main sleeve body having a sleeve main body outer surface and coaxially mounted within the main housing, the operation counter assembly comprising:

a reset plunger assembly including a reset plunger positioned on a portion of the main housing body surface, adapted to extend at least portions of the reset plunger through a reset plunger opening in a medial portion of the main sleeve body when in a non-reset and biased inward lock position to releasably lock the main sleeve body in an extended position so as to obtain and maintain an electrical clearance between a ring engaging terminal and a hook engaging terminal of the circuit interrupting device when the ring engaging terminal and the hook engaging terminal engage the circuit isolating device and when the main sleeve body is positioned in the extended position, and adapted to reset outwardly responsive to outwardly

biased pressure by a user and outward pressure from the main sleeve outer surface when main sleeve body is in an at least partially retracted position; and

an operation counter connected to the reset plunger and positioned to count and display a number of circuit interrupting operations of the circuit interrupting apparatus and responsive to movement of the reset plunger.

12. An operation counter assembly as defined in Claim 11, wherein the operation counter includes a rotational counter incrementor to increment a count of the operation counter, and wherein the operation counter assembly further includes a roll pin connected to the reset plunger and a click-over lever connected between the rotational counter incrementor and the roll pin and responsive to longitudinal movement of the reset plunger in a first direction to reset the counter to enable the operation counter to increment and responsive to longitudinal movement in a second direction to increment the operation counter when such movement occurs.

13. An operation counter assembly as defined in Claim 11, wherein the operation counter includes a counter incrementor switch to increment a count of the operation counter, and wherein the operation counter assembly further includes means for engaging the counter incrementor switch positioned to increment the operation counter responsive to movement of the reset plunger in a longitudinal direction.

14. An operation counter assembly as defined in Claim 13, wherein the means for engaging the counter incrementor switch includes a magnet positioned adjacent a portion of the reset plunger, and wherein the counter incrementor switch includes a magnetic switch responsive to positioning of the magnet adjacent the magnetic switch resulting from longitudinal movement of the reset plunger.

15. An operation counter assembly as defined in Claim 13, wherein the operation counter assembly includes a magnetic flux determiner for measuring the strength of the magnetic flux to determine a categorical type of usage of the circuit interrupting apparatus, and wherein the operation counter separately records a number of counts associated with each of the categorical type of usages.

16. An operation counter assembly as defined in Claim 13, wherein the operation counter assembly includes a selection switch for selecting a plurality of categories of amperage range of values most closely associated with the circuit isolating device, and wherein the operation counter separately records the count and associates the count with a category selected from the plurality of categories and tracks a number of counts associated with each of the plurality of categories and displays the number of counts associated with the category so selected.

17. An operation counter assembly as defined in Claim 11, wherein the main housing body includes a main housing body opening, and wherein the reset plunger assembly further includes a reset plunger extension connected within and extending out from the main housing body opening and having a reset plunger conduit, and a spring to bias the reset plunger in an inwardly direction such that the reset plunger engages the reset plunger opening when the main sleeve body is extended such that the reset plunger opening is adjacent the reset plunger.

18. An operation counter assembly as defined in Claim 17, further comprising an operation counter housing having an operation counter housing front, an operation counter housing back, and at least one operation counter housing side positioned therebetween and containing the operation counter within, the operation counter housing back having an operation counter housing back opening positioned in a surrounding relationship around outer surface peripheries of the reset plunger extension to prevent contamination of the operation counter from contaminants external to the operation counter housing, the operation counter housing front having an operation counter housing front opening also positioned in a surrounding relationship

around outer surface peripheries of the reset plunger extension to prevent contamination of the operation counter from contaminants external to the operation counter housing.

19. An operation counter assembly as defined in Claim 11, wherein the operation counter is non-resettable by a field operator in order to prevent inadvertent reset of the operation count.

20. An operation counter assembly as defined in Claim 11, further comprising a fastener to retrofit the operation counter housing to a pre-existing circuit interrupting apparatus.

21. A method of forming a circuit interrupting apparatus adapted to count a number of circuit interrupting operations, the method comprising the steps of:

providing an operation counter assembly including an operation counter housing containing an operation counter and an operation counter actuating switch and having an operation counter housing back side opening adapted to interface with a reset plunger protruding through a main housing body outer surface of the circuit interrupting apparatus and an operation counter housing front side opening for allowing passage of the reset plunger through the operation counter housing;

installing an operation counter actuating switch actuator to the reset plunger; and

fastening the operation counter housing to the main housing body of the circuit interrupting apparatus.

22. A method of using a circuit interrupting apparatus on a circuit isolating device, the method comprising the steps of:

positioning a reset plunger to extend through a reset plunger opening in a portion of a main sleeve body positioned within a main housing body of the circuit interrupting apparatus when the main sleeve body is positioned in an extended position;

engaging a hook-like conducting part of the circuit isolating device with a hook engaging terminal of the circuit interrupting apparatus adapted to electrically connect to the hook-like conducting part;

engaging a ring like conducting part of the circuit isolating device with a ring engaging terminal of the circuit interrupting apparatus adapted to electrically connect to the ring-like conducting part of the circuit isolating device, the ring like conducting part being relatively moveable between a contacting position to establish a closed circuit through the circuit isolating device and a separated position to establish an open circuit through the circuit isolating device and to extend the main sleeve body from within the main housing body of the circuit interrupting apparatus;

extending at least portions of the reset plunger through the reset plunger opening in the medial portion of the main sleeve body responsive to positioning of the main sleeve body in the extended position; and

incrementing an operation counter connected to the main body housing of the circuit interrupting apparatus upon and in response to extension of the at least portions of the reset plunger through the medial portion of the main sleeve body.